PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Kalispel Tribe Resident Fish

BPA project number: 9500100
Contract renewal date (mm/yyyy): 1/2001 ☒ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Kalispel Tribe of Indians

Business acronym (if appropriate) KNRD

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
Section 10.8B.14, 15, 16, 18 and 19

FWS/NMFS Biological Opinion Number(s) which this project addresses
N/A

Other planning document references
Resident Fish Managers multi-year implementation plan
Upper Columbia Blocked Area Management Plant (in press)
Northwest Power Planning Council Fish and Wildlife Program
Kalispel Natural Resource Department Fish and Wildlife Management Plan

Short description
Assess native trout habitat in tributaries to the Pend Oreille River and implement recommendations for enhancement. Provide largemouth bass habitat in mainstem Pend Oreille River and supplement population. Monitor and evaluate all enhancement measures.

Target species
bull trout, westslope cutthroat and largemouth bass

Section 2. Sorting and evaluation

Subbasin
Pend Oreille

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☐ Anadromous fish ☒ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☐ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☒ Operation & maintenance ☐ New construction ☒ Research & monitoring ☒ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9700400	Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams	Information exchange/equipment sharing/blocked area coordination.
9700300	Box Canyon Watershed Project	Cooperative development and implementation to protect and/or restore fish habitat and water quality in the watershed. Information exchange/equipment sharing/blocked area coordination.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1995	Assessed priority tributaries	Yes
1995	Developed recommendations for tributary enhancement	Yes
1995	Designed largemouth bass hatchery	Yes
1995	Designed for brook trout removal	Yes
1995	Developed recommendations for warmwater habitat enhancement	Yes
1996	Constructed largemouth bass hatchery	Yes
1996	Implement tributary enhancement measures	Yes, implemention began in 1996 and ended in 1998
1996	Implement brook trout removal	Yes, implemention began in 1996 and ended in 1998
1996	Implement warmwater habitat enhancement	Yes, implemention began in 1996 and ended in 1998.
1997	Monitor and evaluate tributary enhancement	Yes, began monitoring in 1997 and will continue through 2003.
1997	Monitor and evaluate warmwater habitat enhancement	Yes, began monitoring in 1997 and will continue through 2003.
1999	Released 150,000 largemouth bass	No, interium targets set for 2003 and final target in 2008
1999	Monitor and evaluate largemouth bass supplementation	No, interium targets set for 2003 and final target in 2008

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Monitor and evaluate habitat enhancement projects	a	Conduct post-assessments on enhancement structures built during 1996-1998 by an intensive assessment of the enhancement area and fish snorkel survey.
		b	Conduct post-assessments on fencing and riparian planting reaches completed during 1996 and 1997 through an intensive assessment of the enhancement area and fish snorkel survey.

		c	Conduct post-assessments on small woody debris removal reaches completed during 1996 and 1997 through an intensive assessment of the enhancement area and fish snorkel survey.
2	Maintenance of habitat enhancement structures.	a	Maintain and repair any damage to habitat enhancement structures.
3	Develop recommendations for additional enhancement.	a	Based upon information collected in post-assessments, develop recommendations for enhancement measures in additional reaches of streams.
4	Conduct habitat assessments and species distribution on additional tributaries to the Pend Oreille River.	a	Assessment of Pend Oreille River tributaries utilizing Kalispel Natural Resource Department Habitat Assessment Methodology.
		b	Snorkel tributaries to Pend Oreille River to determine species distribution and abundance.
5	Monitor and evaluate warmwater habitat enhancement project.	a	Electroshock warmwater enhancement structures placed in Box Canyon Reservoir to determine fish utilization and enhancement effectiveness.
		b	Based on information collected in monitoring and evaluation phase, develop recommendations for additional warmwater enhancement structures.
6	Operate and maintain largemouth bass hatchery to increase harvestable biomass in Box Canyon Reservoir.	a	Egg collection, spawning and incubation of largemouth bass to meet 2001 APG.
		b	Hatch, rear and train on feed, juvenile largemouth bass.
		c	Mark all hatchery production and outplant fry and fingerlings to Box Canyon Reservoir.
7	Monitor and evaluate effectiveness of largemouth bass supplementation.	a	Sample Box Canyon Reservoir to determine effectiveness of hatchery supplementation.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	6/1997	6/2016	97,410 bull trout 242,212 cutthroat	X	20.00%
2	6/1997	6/2008			5.00%
3	11/2000	11/2008	Based upon M&E, develop recommendations for additional streams		5.00%
4	1/1997	1/2001+	Determine habitat quality, species distribution and abundance		10.00%
5	1/1997	1/2008+	0+ survival of 15-20%	X	10.00%
6	1/1997	1/2008	12 lbs/acre	X	40.00%
7	6/2000	1/2004	12 lbs/acre	X	10.00%
				Total	100.00%

Schedule constraints
Project has ended a three year enhancement phase. Monitoring and evaluation of the enhancement measures started in 1997 and will continue through 2001. Biological objectives are set for 2003, 2008 and 2016.

Completion date
2016+

Section 5. Budget

FY99 project budget (BPA obligated): $286,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%42	126,000
Fringe benefits		%13	40,000
Supplies, materials, non-expendable property		%3	9,000
Operations & maintenance		%14	41,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related		%0	

support			
PIT tags	# of tags:	%0	
Travel		%2	5,000
Indirect costs	20% of all except capital and subcontractors	%15	45,500
Subcontractor	WDFW & N.W. Marine Tech.	%10	30,500
Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			$297,000

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
USFS	labor and materials	%1	2,500
Trout Unlimited	labor and materials	%0	1,000
Inland Empire Bass Club	labor and materials	%0	1,500
		%0	
Total project cost (including BPA portion)			$302,000

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$400,000	$410,000	$420,000	$430,000

Section 6. References

Watershed?	Reference
☐	Ashe, B.L., K.L. Lillengreen, J.J. Vella, L.O. Clark, S. Graves, M.R, Barber, G.J.Nenema, Jr., and A.T. Scholz. 1991. Assessment of the fishery improvement opportunities on the Pend Oreille River. Upper Columbia United Tribes Fisheries Center.
☐	Barber, M.R., B.L. Renberg, J.J. Vella, A.T. Scholz, K.L. Woodward and S. Graves. 1990. Assessment of the fisheries improvement opportunities on the Pend Oreille River. Upper Columbia United Tribes Fisheries Center, Annual Report 1990.
☐	Bennett, D.H. and M. Liter. 1991. Water quality, fish and wildlife characteristics of Box Canyon Reservoir, Washington. Department of Fish and Wildlife Resources College of Forestry, Wildlife and Range Sciences University of Idaho, Section 3.
☐	Bennett, D.H. and J.W. Garrett. 1994. Abundance and habitat use of Box Canyon Resrevoir, Pend Oreille River, Washingtion and tributaries by trout with emphasis on brown trout. Completion Report 1992-1993. Dept. of Fish and Wildlife Res., College of Forest

☐	Bonga, D. 1978. Kalispel Indians: A fishing tribe. Kalispel Tribe internal report.
☐	Espinosa, A. 1988. Clearwater Stream Survey Methodology. Clearwater National Forest, Orofino, Idaho.
☐	Hillman, T.W. and W.S. Platts. 1993. Survey plan to detect the presence of bull trout (Salvelinus confluentus). Prepared for Intermountain Forest Industry Association, Coeur d' Alene, ID by Don Chapman Consultants, Inc., Boise, ID.
☐	Hunter, C.J. 1991. Better trout habitat: A guide to stream restoration and management. Island Press, Washington D. C.
☐	MacDonald, L.H., A.W. Smart and R.C. Wissmar. 1991. Monitoring guidelines to evaluate effects of forestry activities on streams in the Pacific Northwest and Alaska. EPA/910/9-91-001. Developed for Region 10, US Environmental Protection Agency. College of
☐	Murphy, P. and C.W. Huntington. 1995. Updated Stream Survey Methodology for the Clearwater National Forest. Internal Document. Clearwater National Forest.Orfino, Idaho.
☐	Northwest Power Planning Council. 1994. Columbia River Basin Fish and Wildlife Program 94-55.
☐	Northwest Power Planning Council. 1995. Columbia River Basin Fish and Wildlife Program. Resident Fish and Wildlife Amendments 95-20.
☐	Kalispel Natural Resource Department and Washington Department of Fish and Wildlife. 1995. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife. Contract number
☐	Kalispel Natural Resource Department and Washington Department of Fish and Wildlife. 1996. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife. Contract number
☐	Kalispel Natural Resource Department. 1997. Fish and wildlife management plan.
☐	Kalispel Natural Resource Department. 1997. Stream survey methodology.
☐	

PART II - NARRATIVE

Section 7. Abstract

The Kalispel Resident Fish Project (NWPPC Program Measure 10.8B.14-16, 18 and 19) was designed to assess and determine the habitat conditions in the tributaries to the Pend Oreille River that are limiting to the native bull trout and cutthroat trout populations. Based on the habitat assessments, recommendations for enhancement measures were developed to increase the quality and quantity of habitat for native salmonids. All enhancement measure sites were subjected to an intensive pre-assessment

of habitat and fish populations that will be used in comparison to three years of post assessments to determine the types of enhancement that provide the most benefit to habitat conditions.

In conjunction with the tributary enhancement efforts, this project has a mainstem enhancement component. A largemouth bass hatchery as been constructed to facilitate the production and rearing of juvenile bass for supplementation and thereby increase the production of harvestable bass within the reservoir. To enhance the overwinter survival of juvenile bass, artificial habitat is being added to the almost structure free reservoir. Subsequent habitat and population assessments will be used to determine the effectiveness of enhancement measures toward meeting the established biological objectives for both the tributaries and mainstem.

Section 8. Project description

a. Technical and/or scientific background

In an attempt to partially mitigate for the resident and anadromous fish losses caused by hydropower development and operation, the Northwest Power Planning Council called for recommendations to develop a program that would provide measures to protect, mitigate and enhance fish and wildlife affected by the construction and operation of hydroelectric facilities located on the Columbia River and its tributaries. The Kalispel Tribe, in conjunction with the Upper Columbia United Tribes Fisheries Center, undertook a three year assessment of the fishery opportunities in the Pend Oreille River (Ashe et al. 1991) to provide the NWPPC with their recommendations. Their findings indicated that trout species were rare in the reservoir, composing less than 1% of the total abundance. Brown trout were the most abundant trout species. Factors limiting trout production in the reservoir were identified as warm water temperatures, lack of habitat diversity and food availability. Trout were more abundant in the tributaries to the reservoir, which mostly supports brook trout and brown trout, however cutthroat, rainbow, and bull trout were also captured. In addition to their finding on trout, they also found that growth rates of largemouth bass during the first four years in the Box Canyon Reservoir were lower than bass from other locations of the northern United States. The slower growth combined with a high rate of juvenile mortality associated with lack of overwintering habitat have reduced the potential for the bass population within the reservoir.

Bennett and Liter (1991) described the fish communities in Box Canyon Reservoir, the sloughs, and tributaries and examined factors which could limit gamefish production. Their findings determined that factors such as warm water temperatures and thermal barriers at the mouths of sloughs limited native trout. They estimated that overwinter survival of age 0^+ largemouth bass in Box Canyon Reservoir ranged from 0.4-3.9%. It was suspected that poor overwinter survival is partially due to the lack of cover during the winter months.

Ashe (1991) provided recommendations based upon their findings for enhancing fishery opportunities. These include: 1) recommending the possibility of an off-site rearing facility to supplement the number of juvenile largemouth bass within the Box Canyon Reservoir, 2) enhancing tributary populations of native trout, and 3) increase the

abount of overwinter habitat in the reservoir. Bennett and Liter (1991) suggested management possiblilites in Box Canyon Reservoir such as providing age 1^{+} largemouth bass to enhance recruitment and introduction of a predator species to take advantage of the extensive forage base.

The recommendations in Ashe (1991) were adopted and incorporated into the 1994 resident fish and wildlife section of the Council's Program and further revised in the NWPPC 1995 Program. These recommendations called for:

1) Restoring tributary populations of native cutthroat and bull trout, and

2) Enhancing the largemouth bass population to provide a quality sport fishery and subsistence fishery in the reservoir.

While it may seem that these goals may conflict with each other, they do not primarily due to the vastly difference in habitat between the tributaries and Box Canyon Reservoir. The Box Canyon Reach of the Pend Oreille River was formed in 1955 by the construction of Box Canyon Dam. The dam forever changed the habitat in this reach to a broad but shallow reservoir. This resulted in higher seasonal water temperatures that exceeds Washington Department of Ecology temperature standards on a regular basis in the summer. This change in habitat made favorable conditions for warmwater species. Based on Ashe (1991) and Bennett and Liter (1991), the most abundant species is the yellow perch. The other species in descending order based on relative abundance are pumpkinseed, tench, and largemouth bass. Trout species are rare, and of the trout species that are present, brown trout are the most abundant. These temperature conditions limit the distribution for native trout. In addition to the differences of habitat between tributaries and the reservoir, preliminary adfluvial trapping data suggests that adfluvial populations of cutthroat and bull trout are non-existent. . Thus habitat overlap between native trout and largemouth bass is unlikely and interaction very unlikely (NEPA Doc, 1996).

b. Rationale and significance to Regional Programs

The Kalispel Resident Fish Project addresses resident fish substitution measures 10.8B 14-16, 18 and 19 of the Northwest Power Planning Council's Fish and Wildlife Program. This is to partially mitigate for anadromous and resident fish losses due to federally operated hydropower development. This project is also consistent with management objectives and vision of the Blocked Area Management Plan (in press) and Multi-Year Implementation Plan.

Many precautions have been taken to ensure that this project does not adversely affect native resident fish populaitons. Information on Box Canyon Reservoir and it's tributaries has been obtained chiefly from several major, long-term studies conducted from 1988 through 1993. Bennett and Liter (1991) described the fish communities in Box Canyon Reservoir, the sloughs, and tributaries and examined factors which could limit gamefish production. Their findings determined that factors such as warm water temperatures and thermal barriers at the mouths of sloughs limited native trout. Bennett and Liter (1991) then suggested management possiblilites in Box Canyon Reservoir such as providing age 1^{+} largemouth bass to enhance recruitment and introduction of a

predator species to take advantage of the extensive forage base. Bennett and Garrett (1994) conducted a study in 1992 and 1993 to determine trout abundance and habitat utilization of the reservoir and major tributaries, particulary brown trout. They determined that the potential for trout management in the reservoir is limited.

The Upper Columbia United Tribes (UCUT) Fisheries Center at Eastern Washington University conducted a three year study to assess fishery improvement opportunities in the Box Canyon Reservoir and tributaries and thus recommended fishery enhancement options. Their final report (Ashe et al 1991) synthesized information from the studies conducted from 1988 – 1990 contained in Barber et al. (1989;1990) and Ashe et al. (1991) and was the basis for the Kalispel Resident Fish Project.

c. Relationships to other projects

Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams
Project #9700400

Information collected by the Kalispel Resident Fish Project will be provided to Project #9700400 for synthesis. The synthesized information consists of habitat information, fish distribution informaiton, stocking histories, and results of enhancement monitoring and evaluation. The synthesized information is used to successfully implement management recommendations and ultimately achieve stated goals and objectives in the Upper Columbia Blocked Area Management Plan.

Box Canyon Watershed Project
Project #9700300

Cooperative development and implementation to protect and/or restore fish habitat and water quality in the watershed. Some information has already been collected by the Kalispel Resident Fish Project and will be used in Project #9700300.

d. Project history (for ongoing projects)

The Kalispel Resident Fish Project began in 1995 with; 1) the selection of the study tributaries 2) conducting habitat assessments and 3) conducting assessment of fish populations in those tributaries. Based on the assessments taken during that initial field season, a process was developed to filter out the reaches of those tributaries that contained the most numerous limiting factors to fish habitat quality and quantity (KNRD & WDFW, 1995). A set of recommended enhancement measures were subsequently developed for each of these reaches that are intended to address the specific habitat shortcomings. This list of recommendations was implemented during field season 1996 and became the core for additional recommendations for 1997 and 1998. Field season 1998 was the last year of implementation for recommended enhancement measures for the seven designated study tributaries. Year 2000 will mark the second year of conducting monitoring and evaluation. This monitoring and evaluation data will be used to determine which enhancement measures provide the greatest increase in habitat

qualtity and quantity. This data will then be used to provide recommendations for enhancement beyond the seven study tributaries.

In 1995 the planning for the construction and operation of a low cost bass hatchery also began. Construction of the hatchery began in the summer of 1996 and was partially completed in October of 1997. Final completion was not done until September of 1998. Significant progress has taken place in regards to production procedures, emergency protocol, and operating manuals for the hatchery. Broodfish (27 fish) are kept in the raceway where they are allowed to spawn in the spring. The goals of the hatchery are to facilitate the production and rearing of juvenile largemouth bass for supplementation and thereby increase the production of harvestable bass. The Annual Production Goal (APG) for the hatchery is outplanting 100,000 32mm fry and 50,000 140mm fingerlings into the Box Canyon reservoir.

e. Proposal objectives

Objectives 1-4

The overall biological objectives for bull trout and cutthroat were were identified and incorporated into the 1994 resident fish and wildlife section of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program (NWPPC 1994) and further revised in the NWPPC 1995 program. Monitoring and evaluation of each individual project tributary will determine the need for modification of these objectives.

- Attain densities (all age classes) of 9.8 bull trout/100 m2 (or 390 fish/linear mile) in the upper one third of each major tributary system. This equates to 97,410 bull trout (all age classes) in approximately 250 miles of suitable tributary habiat in the system. Total numbers of bull trout recruited to the fishery will be 4,410 fish, composed of and escapement of 2,205 and harvest of 2,205 fish by the year 2016.
- Interim bull trout targets are established at 48,855 total fish (all age classes), including a total of 2,205 fish recruited to the fishery, composed of an escapement of 1,102 fish and a harvest of 1,103 fish, by the year 2006.
- Attain population of 242,212 adult cutthroat in 500 miles of suitable cutthroat habitat in the system, including and escapement of 156,800 fish and harvest of 85,412 fish by the year 2016.
- Interim cutthroat targets are established at 121,106 total adults recruited to the fishery, composed of and escapement of 78,400 fish and harvest of 42,706 fish by the year 2006.

These objectives all contain interim and final targets that are subject to modification based on the data collected during monitoring and evaluation process. The biological objectives for the individual tributaries will establish goals for production that will increase bull trout and cutthroat trout populations.

Objectives 5-7

Biological objectives for largemouth bass were identified and incorporated into the 1994 resident fish and wildlife section of the Northwest Power Planning Council's

Columbia River Basin Fish and Wildlife Program (NWPPC 1994) and further revised in the NWPPC 1995 program. The largemouth bass biological objectives are as follows.

- Increase the biomass of harvestable largemouth bass in the Box Canyon reservoir from the current 6 pounds/acre to an interim target of 8 pounds/acre by 2003 and a final target of 12 pounds/acre by the year 2008.
- Increase age 0+ largemouth bass overwinter survival from current levels of 0.4-3.9 percent to approximately 15-20 percent.

Specific recommendations or strategies to attain these biological objectives were also formulated and presented to the NPPC for approval and funding. These recommendations are as follows.

- Operate and maintain low-capital warm water hatchery constructed on the Kalispel Indian Reservation to produce 100,000 largemouth bass fry and 50,000 fingerlings for release into Box Canyon reservoir.
- Construct, operate, and maintain water control structures on the Pend Oreille wetlands wildlife project for the purpose of creating bass nursery sloughs.
- Construct, place, and maintain artificial cover structures to increase the amount of bass age 0+ fry winter cover in the Box Canyon reservoir. The purpose of the cover is to increase the overwinter survival of age 0+ largemouth bass.
- Monitor effectiveness of largemouth bass supplementation.

Annual progress reports and quarterly reports will be submitted to BPA.

f. Methods

Objectives1-4

The stream habitat survey methodology contained four facets: transect surveys, reach overviews, interreach comparisons and fish surveys. The compilation of transect surveys and reach overviews were used to define the most degraded reaches through interreach comparisons. Snorkel surveys and electroshocking were used to determine fish population densities and age class distribution for all salmonid populations within each stream and were combined with the interreach comparisons to draw conclusions on the effects of degraded habitat quality and non-native salmonids on native salmonid species. Conclusions were used to aid in more informed restoration recommendations. Stream and fish population survey methodology used within the Box Canyon Reach is similar to that developed by Espinosa (1988) and further revised by Huntington and Murphy (1995).

Habitat surveys were broken into two components 1) transect surveys and 2) reach overview surveys. Transect surveys are the division of the stream into 30m segments. Primary pools, spawning habitat and acting woody debris counts were collected for the entire length of each 30m segment. The remainder of the habitat quality parameters such as habitat type, substrate, habitat function, bank stability, cover, and embeddedness were collected at the end of each 30m segment (the actual transect site). This method allows for a number value to be assigned to each habitat quality parameter. Reaches were defined by stretches of stream with common gradient, substrate and vegetation. Breaks between two homogeneous areas defined a new reach. Reach

overview surveys are the visual observation and description of variables occurring within each reach. Each reach was permanently marked and flagged using aluminum tags and flagging as a reference point for long-term monitoring.

Following the compilation of transect data, an interreach comparison was conducted using the mean values for each reach. This was the fundamental unit of comparison to determine specific reaches for enhancement projects. Threshold values were established for embeddedness, bank stability, bank cover, instream cover, pool-riffle ratio, spawning gravel and primary pools. All threshold values were obtained from Hunter (1991) and/or MacDonald *et al*. (1991). The mean data for each reach was analyzed by using these threshold criteria. Each habitat value that did not fall within the threshold was counted as habitat that was unsatisfactory for quality or quantity. The reaches with the most numerous unsatisfactory habitat values were identified as enhancement sites for that particular stream.

The data from the specific reaches identified in the interreach comparison were evaluated in a flowchart to provide a list of possible options for the types of structures or measures to be used in enhancement (KNRD & WDFW, 1995). The flow chart took into account gradient, embeddedness, and pool to riffle ratio. Each structure is designed to perform specific functions and requires specific habitat placement. Specific structure selection was made by reviewing the list of options for enhancement and choosing the structure that addresses the limiting factors for each particular reach of enhancement. Reach accessibility was also considered when choosing between structures with similar function but varying levels of effort in their construction. Specific placement was determined by the transects within each reach that were in the habitat type each structure was designed for.

Fish density estimates were collected using standard snorkel survey techniques (Espinosa 1988). Sampling was conducted during the period from July 15 through September 15. Population density was addressed by number, size (age class) and species of fish per $100m^2$. The standard size/age classes for salmonid species were determined according to Espinosa (1988). Lengths of stations were 30 meters and selected so that beginning and ending points for stations never bisected pool habitat. Fish stations were permanently marked and flagged using aluminum tags and flagging.

All sites selected as areas for enhancement were pre-assessed using an intense version of the standard transect methodology, prior to implementation. The only modification to the transect methodology was shortening the length between transects. Riparian project areas were assessed with 10m transects for each kilometer where fencing and planting occurred. Instream structures were assessed using 5m transects from 30m above the structure site to 30m below.

Fish sample stations for riparian restoration were calculated to be one 30 meter snorkel station per every 250 meters of stream. A minimum sample size of three snorkel stations for each restoration area was conducted, unless the area was less than or equal to 90 meters long, in which case the entire area was snorkeled. Assuming the lowest known bull trout population density (0.075 bull trout/30 meters) in the state of Washington (Hillman and Platts 1993), we were 95% confident that if bull trout were in the stretch of the stream we would observe them at this rate of sampling. Bull trout were used to determine the sample size because they are the least abundant native salmonid species in the area.

Each station was benchmarked at the upper and lower boundary with labeled aluminum tags attached to rebar stakes. The same stations will be sampled in the spring, summer, and fall. Data from snorkel stations will be used to determine densities of all fish species present. Fish sampling for instream structures was conducted with a 60m station, 30m above and 30m below, to determine the fish numbers and species associated with the structure. To avoid confusion of benchmarks, fish stations are located at the actual structure.

All instream structures were will be monitored annually for a minimum period of three years. Riparian planting and cattle exclusion fence sites are intended to provide longer term rehabilitation over an extended time schedule. The rate of post-assessment sampling for these sites will be every third year. The post-assessments are a replication of the pre-assessments in the exact same area.

Objective 5

Selection of the sloughs used in the bass habitat study was based on the two types of sloughs available within the reservoir. The sloughs are either backwater stream mouths or dead end river backwater. Four sloughs were selected: one stream fed treatment slough, one stream fed control slough, one backwater treatment slough and one backwater control slough.

Each slough was sampled prior to artificial habitat installation. Two 75 meter transects were established for each slough beginning at the mouth of the slough for 75m with a 75m buffer and then the second transect for 75m. The buffer was established to avoid data collection overlap. Each transect was then electrofished for a period of 300 seconds and all fish were collected. Bass were recorded as to their length and total number all other fish were recorded as total numbers by species.

Two types of artificial structures were used in the treatment sloughs. The Berkley structures are four foot cubes of plastic slats that provide cover in the interstitial spaces. The Pradco structures resemble palm trees and provide cover under the palms. The placement of each type was alternated between the two treatment sloughs (Berkley in the mouth transect in one slough and in the inland transect of the second slough).

Objective 6 & 7

All hatchery-raised largemouth bass released into the reservoir will be marked with a coded-wire tag. All supplementation efforts shall be performed within a 20-30 miles stretch of the 57 mile long Box Canyon reservoir that currently provides suitable largemouth bass habitat. Specific outplanting locations will focus on areas which currently support a viable largemouth bass population.

The different fish sizes will be released at three seperate locations. The first stocking will take place in early summer and will consist of approximately 100,000 fry (~55mm). The second stocking will take place in early fall and consist of approximately 50,000 fingerlings (~125mm). Each group of fish will have its own distinctive tag that will indicate the specific release size

Recapture rates of the different release sizes will be tested for significance using the Chi^2 test of significance (distribution). All hatchery released fish recaptured during the study will be re-marked and released into the reservoir. The mark-recapture numbers will then be summed up for the entire sampling period (March-October).

$$Chi^2 = \sum \frac{(Observed - Expected)^2}{Expected}$$

Each outplanting location will be sampled monthly (March-October) following release. Three ten-minute transects will be performed at each release site. Two transects shall be located on opposite banks within the slough and another located immediately downstream of the slough in the main channel. All areas will be sampled with a Smith-Root electro-shocking boat. Only largemouth bass will be sampled. A catch per unit effort (CPUE) will be calculated for each transect and release area.

$$CPUE = \sum \frac{Sample\ time}{Fish\ sampled}$$

A Jolly-Seber model will be used to generate survival estimates for the hatchery-raised fish. The data gathered during the study will be entered into a computer-based program entitled "MARK". This program utilizes a Jolly-Seber model to generate survival estimates. The survival rates between hatchery-raised bass and the native population will be compared, along with different survival rates between release sizes.

Increased survivability of hatchery-raised fish within the reservoir shall be the most important variable considered when deciding which stocking size best satisfies the biological objective of increasing the biomass of harvestable bass. Another factor involved in the decision criteria is the overall cost associated with each release size. Generally, the smaller the fish at the time of release, the lower the cost.

g. Facilities and equipment

The habitat portion of this project is supported by the Kalispel Natural Resource Department office. Within the office, there is suitable computers. The office is internet accessible. Currently there is one vehicle being lease under the habitat portion.

The hatchery building contains an office with computers, mud-room, life support system, and troughs. The life support system contains the following: overhead distribution lines for air and water; a floor-mounted and LPG powered boiler with plate heat exchanger and (2) circulation pumps; a 46 inch diameter by 9 ft tall biofilter with backwash motor (for raceway and trough water reuse during power outages and/or early start on spawning and incubation); a wall-mounted 10 lamp ultraviolet (U.V.) disinfection unit; and two loft-mounted water treatment units consisting of a 30 micron rotating drum screen (for screening river water prior to its use at the hatchery and the raceway), and a 12-inch diameter degassing column for re-aerating reuse water and for degassing of any heated water.

A reinforced concrete raceway, measuring 8 ft wide by 60 ft long and 4 ft deep, will be used for largemouth bass spawning as well as intensive rearing. The raceway unit is fully enclosed.

The two sloughs located in the northwest section of the Pend Oreille Wetlands Wildlife Mitigation Project are used as largemouth bass nurseries. A sheet-pile dam are at the mouth of each slough. A 4-inch diameter valved water pipeline supplies water to the slough. Stop-logs control water level and a valved bottom outlet pipe for draining and to facilitate fish harvest and pond maintenance.

The hatchery also has a 1-ton pickup that is being leased.

h. Budget

The funding for the previous years is as follows: 1995-$239,901, 1996-$955,083, 1997-$643,304, 1998-$511,000, and 1999-$286,000. The first year was the planning phase, then followed by construction of the hatchery and implemention of the habitat portion for the two following years (1996 and 1997). The habitat portion continued to be implemented in 1998. Year 2000 will mark the second year of solely conducting monitoring and evaluation and O&M for the hatchery. This is the reason for the reduction in budgets in 1999 and 2000.

Personnel and benefits covers 4.5 FTE's, two of which work at the hatchery. Roughly 80% of the supplies and materials line item cover annual operations at the hatchery. The operations and maintenance covers the hatchery exclusively (utilities, fish feed, etc.). Travel line item accounts for travel, per diem, and lodging for various meetings and conferences. Indirect costs for the Tribe are 19.9%. Subcontractors under this project are Northwest Marine Technology (fish marking) and Washington Department of Fish and Wildlife.

Section 9. Key personnel

Joseph R. Maroney

Experience

1995-present Kalispel Tribe of Indians Usk, WA

Fisheries Program Manager

- Fisheries Program Manager for the Kalispel Natural Resource Department.
- Presently manage the Kalispel Resident Fish Project
- Kalispel Tribe representive on the Resident Fish Managers Caucus of the Columbia Basin Fish and Wildlife Authority.
- Sit on Fisheries Working Group for four hydroelectric re-licensing projects (Cabinet Gorge, Noxon, Box Canyon, and Boundary). Involved in deveoping studies and study design plans.
- Conduct snorkeling surveys, habitat assessments, and electrofishing surveys for tributaries to Pend Oreille River and Priest Lake.
- Contribute in duscussion with state, county, federal, tribal, and foreigh governments regarding fisheries issues in the Upper Columbia.
- Write scientific reports
- Track budgets for Fisheries Division.

1991-1994 Clearwater Biostudies, Inc. Canby, OR
Fisheries Biologist

- Conduct habitat assessments in Clearwater National Forest. Information collected consisted of embeddeddness measurements, riparian evaluation, spawning gravel (anadromous and resident), habitat type, RASI, Wolman Pebble counts, LWD, bank and instream cover utilizing the Clearwater National Forest 30 meter transect methodology.
- Write overview of each reach to summarize findings, limiting factors, and potential for enhancement.
- Snorkel to identify salmonids and distinguish age classes.
- Responsibilities include training and overseeing new technicans.

1994 Eastern Washingtion University Cheney, WA
Research Assistant

- Involved in macroinvertebrate survey for U.S. Forest Service.
- Work consisted of collecting,sorting, picking, counting, and identifying to species, macroinvertebrates from selected streams on the Colville National Forest.

1991 Washington Dept. of Fisheries Montesano, WA
Fisheries Technician

- Dig and collect razor clams on a monthly basis to dermine size and population.
- Take gill samples of razor clams, store in alcohol, and ship to Battelle Labs for study to determine if NIX is present.

1990-1991 Washington Dept. of Wildlife Aberdeen, WA
Hatchery Technician

- Work consisted of: feeding, spawing, incubation, and culture of steelhead trout, sea-run cutthroat trout, and chinook salmon.
- Took samples such as kidney, scale, heart, and cheek muscle tissue for disease and stock identificaiton.

Education

1992-1994 Eastern Washington University Cheney, WA

- Bachelors of Science in Biology
- Option in Zoology

1990-1991 Grays Harbor College Aberdeen, WA

- Associate of Applied Science in Fisheries and Wildlife Management.

1988-1991 Spokane Fall Community College Spokane, WA

- Associate of Arts

Publications

Kalispel Natural Resource Department. 1997. Fish and wildlife management plan.

Kalispel Natural Resource Department and Washington Department of Fish and Wildlife. 1995. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administrartion, Division of Fish and Wildlife. Contract number 95-BI-37227.

Kalispel Natural Resource Department and Washington Department of Fish and Wildlife. 1996. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administrartion, Division of Fish and Wildlife. Contract number 95-BI-37227.

Kalispel Natural Resource Department. 1997. Habitat inventory and salmonid abundance for South Fork Granite Creek.

Kalispel Natural Resource Department. 1997. Stream survey methodology.

Stanley J. Bluff jr.

Experience

1996-present Kalispel Tribe of Indians Usk, WA

Hatchery Manager

- Operate and maintain the hatchery and associated facilities. Mark all hatchery production.
- Monitor the effectiveness of the hatchery by sampling Box Canyon Reservoir.
- Produce monthly reports and an annual report detailing hatchery production.
- Supervise hatchery personnel
- Oversee O & M budget for largemouth bass hatchery.
- Installed internal components of the hatchery

1994-1996 Spokane Agency/BIA Wellpinit, WA

Management Assistant/Supervisory Forester

- In charge of timber sale preparation program on the Spokane Indian Reservation.
- General responsibilities include coordination, directing , supervising all phases of permit and sale preparation, from receipt of the prescriptions to advertisement and award of sales and contracts.
- Supervise 3 to 7 forestry technicians.

1989-1994 Spokane Agency/BIA Wellpinit, WA

Presale Forester

- Responsibilities include marking timber, designing cruises, preparing timber sale documents (contracts, NEPA compliance, etc) prescribed fire duties and other duties related to the timber sale program.

Education

1987-1989 University of Montana Missoula, MT

- Bachelor of Science Degree

1985-1987 Spokane Community College Spokane, WA

- Associate of Arts

Publications

Kalispel Natural Resource Department and Washington Department of Fish and Wildlife. 1997. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administrartion, Division of Fish and Wildlife. Contract number 95-BI-37227.

Kalispel Natural Resource Department. 1997. Largemouth bass supplementation plan.

David R. Nenema

Experience

1996-present Kalispel Tribe of Indians Usk, WA

Hatchery Technician

- Operate and maintain the hatchery and associated facilities. Mark all hatchery production.
- Monitor the effectiveness of the hatchery by sampling Box Canyon Reservoir.
- Installed internal components of the hatchery

Section 10. Information/technology transfer

Information will be in the form of annual reports, scientific reports, web pages, Streamnet, and public presentations.

Congratulations!